



LOCOMOTIVE

..... AUDIO

USER'S MANUAL

MODEL 14B

SINGLE CHANNEL TUBE COMPRESSOR

HANDMADE IN ST. LOUIS, MO USA



INTRODUCTION

Thank you for your purchase of the Locomotive Audio Model 14B! This hand-built vacuum tube compressor is a product of so much time, research and development. Inspired by many beautiful pieces of equipment from the 50s and 60s, we were able to design a circuit with high quality components and modern features for today's engineers. With proper treatment, our products will be able to give you many years of reliable service, so you can focus on being creative and making the best recordings possible! We thank you for your support of Locomotive Audio.

LEGAL NOTICES

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Manual Revision 14B-1

All information provided in this manual is thought to be accurate and free of errors at the time of printing. Locomotive Audio, LLC shall not be liable for any errors or omissions in this manual.

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WARNINGS & SAFETY

Before powering up your new Locomotive Audio unit for the first time, please understand the dangers of vacuum tube electrical equipment. The extremely high voltages within the chassis and around the tubes can **SERIOUSLY INJURY OR EVEN KILL YOU.**

Before plugging your unit into the wall, please make sure all tubes are properly seated in their sockets and not bent or angled with the tube pins exposed. The base of the tube should be flush with the tube socket.

Also be sure to mount your unit in a stable, secure rack to reduce the risk of movement and damage. The unit is grounded through the IEC power cord supplied in the box. Always use a properly grounded outlet and never use a ground lift plug adapter for a non-grounded outlet. Do not use unit near any liquid or excessive moisture. If liquid were to enter the unit, unplug IEC power cord from wall and wait at least 5 minutes before attempting to touch or clean the unit.

The user should not attempt to service this product beyond changing tubes. The 14B has a hinged front panel that allows for easy access of internal parts if issues were to arise. Only a trained technician should make modifications or adjustments as the voltages within the chassis are very dangerous!

BOX CONTENTS

Your Locomotive Audio product should have been shipped with the following contents:

- (1) 14B unit
- (1) User's Manual
- (1) IEC Power Cord

INSTALLATION

Vacuum tube equipment can get very hot, so thought and care should be taken in how it is installed. The 14B will fit in a 19" equipment rack, taking 2 units of space (2U). The chassis for the 14B has vents punched out of the top and sides for heat to escape. It is good practice to leave 1U of space above the unit for better ventilation.

The Locomotive 14B has its tubes and transformers installed on the outside of the unit. Route audio and power cords in a direction where they would be least likely to touch these components.

LINE VOLTAGE & FUSE

The unit is powered by 115v or 230v AC sources. The AC Voltage Slide Switch (page 8) is preset by Locomotive Audio before leaving production. Before using the 14B for the first time, please make sure the AC Voltage Slide Switch on the back of the unit (page 8) is in the correct position for your mains voltage. **If operated set to the incorrect voltage, harm to the unit may result.** With unit turned off, use a flat-head screwdriver to change the voltage selection if necessary.

All Locomotive Audio products contain a fuse in the IEC power entry module for protection of both YOU and the unit. In order to check or replace the fuse, a small flat-head screwdriver is needed to open the fuse drawer. Be sure to unplug the unit before beginning this procedure. Always replace the fuse with the same rating and type as specified for your mains voltage on back of the unit. If replacement fuses of the correct specifications consistently blow, there may be an issue with the unit and qualified service technician should be contacted. If within warranty period, please contact Locomotive Audio for instructions.

POWERING UP

Once installed in a secure equipment rack and plugged into the AC mains power source, the user may then power the unit on by flipping the power switch on the front of the unit to the up position. At this point, the power lamp will light, and the unit will need at least 5–10 minutes for the tubes to warm up for best results.

POWER LAMP & VU BULBS

The power lamp and backlit VU meter will illuminate after the unit is switched on. If either of these do not light, the bulb may be burned out or there may be another underlying issue. The first step would be to replace the bulb. If replacement is necessary, use a 14V .08A bayonet style bulb for the power lamp and a 6.3V 1 watt festoon style bulb for the VU meter.

MAIN FEATURES

- **Tubes:** (1) 6BC8, (1) 12AY7, (2) 6V6s
- **Classic feedback tube compression circuit**
- **Stereo Link switch**
- **Sidechain Low Cut filter control: Off and 70-350Hz**
- **Hard-wire bypass switch**
- **Variable input & output controls**
- **Variable Attack & release controls**
- **Compress / Limit switch**
- **Compression turned off with full counterclockwise attack position switching to line amplifier**
 - **Two position VU meter switch: Gain Reduction - Output**
- **6BC8 balance adjustment on interior of unit**
- **Custom Sifam backlit VU meter**
- **XLR input and output connections**
- **Cinemag input and interstage transformers**
- **High-grade Solen capacitors in signal path**
- **Hand-built in USA with classic turret board technique**
- **Heavy 16 gauge steel chassis**
- **115v/230v AC mains option on rear**
- **Backed by 2-year limited warranty parts and labor**

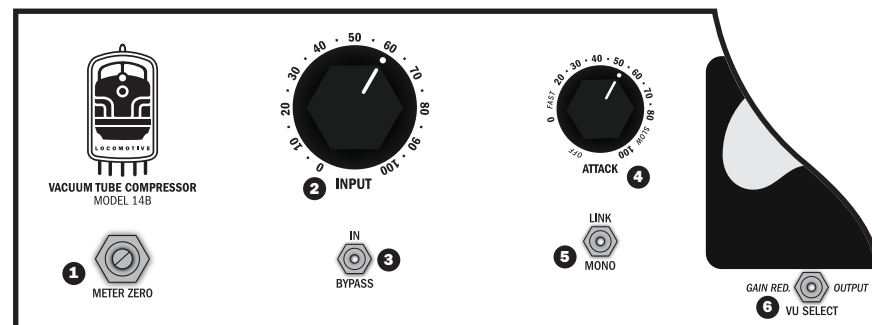
14B SPECIFICATIONS

The technical data listed below may change without notice as we are consistently trying to improve our products

- **Input load impedance:** 10k Ω
- **Output impedance:** <800 Ω
- **Variable Attack:** (300 μ s–5ms)
- **Variable Release:** (100ms–1sec)
- **Compression (up to 6:1 ratio) or Limiting (up to 14:1 ratio)**
- **Flat frequency response:** 20Hz-20kHz
- **THD+N:** <1%
- **S/N ratio:** >70dB
- **Dimensions:** 19" w x 3.5" h x 10" d (2u rackspace)
- **Shipping Weight:** 20 lbs.
- **Power Consumption (120/240VAC):** 42 watts

ABOUT THE 14B

Locomotive Audio's single channel 14B compressor and limiter is based on a very old, but still very exciting concept of rebiasing the input tube with a sidechain control voltage. After all, some of the most famous compressors in history, such as the Fairchild 670, Gates Sta-Level and Collins 26U, employed this very technique. The results are a sound that cannot be replicated with other ways of gain reduction. The Locomotive Audio 14B and its added modern features allow it to achieve a unique sound in its own right. Starting with the semi-remote cutoff 6BC8 tube, a 12AY7 then drives two powerful push-pull 6V6 output tubes. The 14B is quite a versatile unit, with the ability to run soft and gentle or hard and aggressive. A sidechain low cut control offers even more flexibility, especially when used on the mixbus and linked with another 14B. This versatile unit can be used on all kinds of source material including vocals, drums, guitars, bass, piano and horns. With its high quality Cinemag input and interstage transformers, the 14B has the ability to define mid-range clutter and control the peaks at the same time. The user will notice an enhancement on any material run through this unit, even when not compressing.



14B FRONT PANEL SETTINGS

1. METER ZERO ADJUSTMENT

Loosen the locking nut to adjust the VU meter so that the needle rests at approximately 0 dB when G.R. is selected on the VU Select Switch under the meter.

Note: After turning on the 14B, the meter will take about 10–20 seconds to climb towards the 0 dB mark. Sometimes the meter may take 20–30 minutes to adjust completely. What this means is that the input tube (6BC8) is finally warmed up properly and has reached its stable current.

2. INPUT

The input knob sets the amount of signal that enters the active circuitry. By increasing input by turning clockwise, more signal will pass over the threshold, resulting in higher amounts of compression.

3. IN/BYPASS SWITCH

This hard-wired bypass switch allows you to quickly listen to the differences between the original signal and the 14B processed signal.

4. ATTACK

The attack knob sets the time that it takes for the 14B to react and start to compress a signal that has gone over the threshold. The 14B has great flexibility in its range of attack timing circuitry allowing for a large palette of tone shaping possibilities. Set near “0” or “Fast”, the engineer can use the 14B for aggressive peak control nearly as fast as a FET style limiter, but can also be adjusted to allow transients through unaffected much like slower optical compressors when set near “100” or “Slow”. Having the flexible range of attack timing will allow for the engineer to use the 14B on a wide range of material. The attack knob may also be turned to its maximum counterclockwise position to switch compression off, making the 14B a line level amplifier.

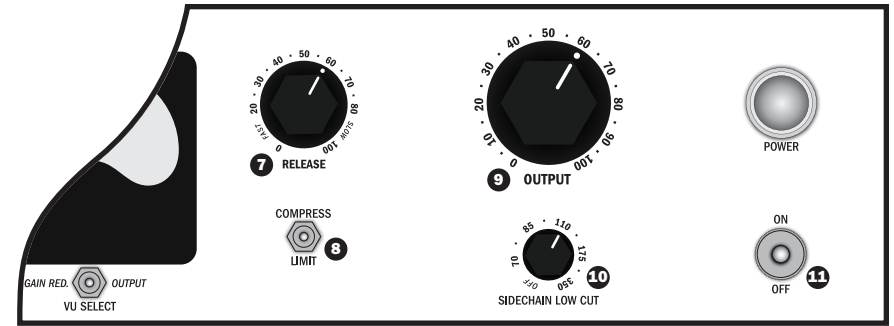
5. LINK/MONO SWITCH

Two 14B compressors may be linked by a 1/4” cable on the back of each unit, allowing them to work together in tandem. If both units are set to “Link” mode, they will share sidechain control voltages with each other, preserving the center image on a stereo track.

For example, if using the units on your master mixbus, dynamic elements from left and right channels will likely be different. You may have a guitar panned fully to the left channel, unpanned vocals in the center and a banjo panned fully to the right channel. If using the two 14Bs in dual mono (unlinked), the banjo’s dynamics will cause compression on only the right channel and therefore the vocal coming out of the right channel will also be compressed, leaving the vocal coming out of the left channel unaffected. This will cause the centered vocal to move in the stereo image. Not good... unless that is what you are going for! Having both units switched to “Link” mode will tell both compressors to react the same when either is forced to compress. So, if the right compressor reacts to the banjo and is forced to compress, the left channel will compress as well. This will allow for elements such as the vocal to stay centered in the mix.

6. VU SELECT SWITCH

This switch allows the engineer to meter how much gain reduction is taking place **or** how much signal is leaving the output of the 14B. When set to “Output” and the needle is deflected to 0dB on the meter, a +4dBu signal (1.228v) is leaving the 14B and into the next device.



7. RELEASE

The release knob sets how long the 14B takes to return to unity gain after the input signal has fallen below threshold of compression. Set near “0” or “Fast” will allow for the compression to release quickly and allow for sounds to be more in up front and in your face. Slower release times will sound more gentle and will allow for more of the original dynamics in the source material.

8. COMPRESS/LIMIT SWITCH

This switch does two things: first, it sets the fixed threshold that the “Input” knob works hand-in-hand with it and also sets the ratio of gain reduction. On a tube compressor like the 14B, the compression ratio continues to increase as the input signal level passes over the fixed threshold. When switched to “Compress” the initial compression is 1.2:1 increasing to 6:1 at 15dB compression. In “Limit” the compression ratio also starts low and increases up to approximately 14:1 at 15dB of gain reduction.

9. OUTPUT

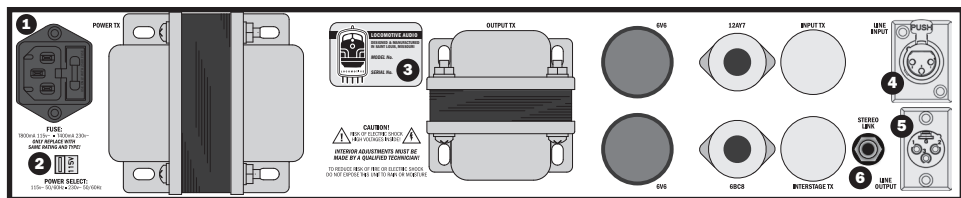
The output level knob allows the engineer to match the output level with the input level.

10. SIDECHAIN LOW CUT

Sets the frequencies that activate gain reduction. Turned and switched to its maximum counterclockwise position, this knob allows all frequencies to enter the sidechain and begin the gain reduction process. Switched on, the 14B will start to roll off reaction to frequencies under the selected 70-350Hz. For example, when using 14B for drum overheads, try sweeping through frequencies over 110Hz and listen to the less compressed kick drum come forward as the snare and cymbals continue to activate compression and move further back in the mix. This is an extremely effective tool for mixbus work as well. It will help to eliminate pumping caused by low frequency material.

11. POWER SWITCH

Switches unit on. Illumination of the power lamp and VU meter will result.



BACK PANEL

1. AC POWER ENTRY MODULE

Accepts standard IEC power cord (included) for 115v or 230v AC mains supply. A fuse is included with each unit for the voltage/current expected at the location being shipped to. Only use a fuse with the same rating and voltage as marked on back of chassis.

2. AC VOLTAGE SLIDE SWITCH

Each unit is factory set to the voltage expected at the location being shipped to. If voltage does not match mains voltage at your location, switch to reveal the appropriate voltage. Do not operate unit set to incorrect voltage. Harm to the unit may result.

3. MODEL/SERIAL # TAG

When registering your product for your 2-year warranty, please see the hand stamped tag to obtain the serial number.

4. BALANCED XLR LINE INPUTS

5. BALANCED XLR LINE OUTPUTS

6. STEREO LINK

Connect two separate 14B units with a 1/4" cable (balanced or unbalanced) to make use of the "Link/Mono" switch on the front panel.

CHANGING TUBES

Each Model 14B will leave Locomotive Audio with a new set of tubes that should last for several years. We encourage you to utilize these tubes, but also experiment with with other brands of New Old Stock tubes to achieve your sounds! There are no rules with brands or age of tubes. But, be sure to use only 6BC8 or 6BZ8, balanced 12AY7 and matched 6V6 tubes in the appropriate tube sockets. This will prevent any issue with the performance of the 14B and damage to the unit.

VU METER CALIBRATION

The VU meters in our units have been pre-calibrated. When needle is deflected to 0dB on the VU meter, a signal voltage of +4dBu will be present on the output of the unit. Turning the small calibration screw on the rear of the VU meter will allow a qualified technician to adjust display levels.

INTERNAL ADJUSTMENTS

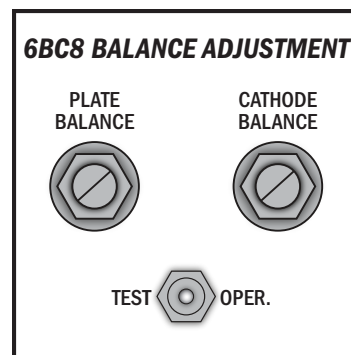
CAUTION: Interior adjustments must be made by a qualified technician. The voltages inside of the 14B are very high and can be lethal. You may contact Locomotive Audio to have this procedure done free of charge. It is also advised to use a nonconductive adjustment tool to avoid shock when the 14B is open.

The adjustments located on the inside of the 14B deal directly with gain reduction 6BC8 input tube. This push-pull gain stage requires a strong balance, otherwise the engineer may hear strange artifacts such as thumping, uncontrolled oscillation or rippling apparent on the compression attack. Each 14B will leave Locomotive Audio fully calibrated. As your 6BC8 ages or with the installation of another 6BC8 tube, the following procedure must be made as no two tubes are the same.

Plate Balance: This potentiometer feeds both halves of the 6BC8 tube the high voltage B+ power.

Cathode Balance: This potentiometer places a resistance on each of the two 6BC8 cathodes and can change cathode current, directly influencing the voltages on the 6BC8 plates. The plate and cathodes work hand-in-hand to change bias points, current and gain within the tube.

Test/Operate Switch: This switch sends a 50/60Hz signal to the input of each half of the 6BC8 tube which can be helpful in balancing.



PROCEDURE FOR A GOOD BALANCE

There are no rules on how to make the adjustment, so we will give you a couple options that work well for us here at Locomotive! The first involves using the "TEST/OPER." switch and the second will utilize a snare drum loop available at www.locomotiveaudio.com

TEST/OPERATE SWITCH PROCEDURE

1. Remove any signal entering the 14B.
2. Set attack and release to the approximate "50" settings
3. Turn both the "Input" and "Output" knobs fully counterclockwise
4. Set "Meter Select" switch to "Output."
5. On the "6BC8 BALANCE ADJUSTMENT PANEL" set the "TEST/OPER." switch to the "TEST" position.

6. Rotate the “Output” knob on the front panel until the needle moves close to the 0dB mark. Being precise is not necessary.

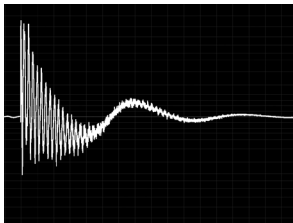
7. Adjust both the “Plate Balance” and “Cathode Balance” while watching the VU meter for a drop in decibels. The idea is to go back and forth between the “Plate Balance” and “Cathode Balance” until you get the lowest reading on the VU meter. It may be necessary to raise the “Output” knob if the needle has dropped so low that you cannot see any more progress from adjustments.

8. After the lowest meter indication has been obtained, set the “TEST/OPER. switch back to the “OPER.” position.

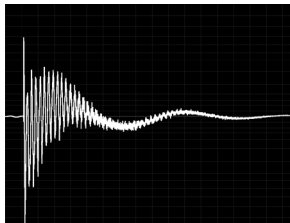
SNARE DRUM LOOP PROCEDURE

While the method above does a relatively good job at balancing the 6BC8 for low gain reduction, it doesn't necessarily mean that the tube is balanced at mid/deep gain reduction, where the 6BC8 is more prone to thumping artifacts. We use the method below in conjunction with the previous method to achieve very good balancing.

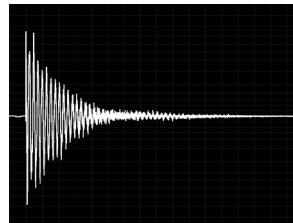
1. Set a fast attack “0” and slow release “100.”
2. Set “Meter Select” switch to “GAIN RED.”
3. Using your DAW, set up a snare drum loop (available at locomotiveaudio.com) so that the snare drum hits every two seconds.
4. Send the snare drum loop to the 14B from your DAW.
5. Turn the “Input” knob clockwise until you can see about 10dB of gain reduction on the 14B VU meter with each snare hit.
6. Now, set the 14B to a fast release “0.”
7. Record the processed signal back into your DAW on a different channel and view the resulting snare hits.
8. Adjust both the “Plate Balance” and “Cathode Balance” while watching each new snare hit until you get a balanced (or close to balanced) compressed waveform. This will be easy to spot. See the images below. Again, just like in the Test/Operate Switch procedure above, you may need to go back and forth between “Plate Balance” and “Cathode Balance” adjusting in small increments to get it just right. Take your time.



Imbalance.



Imbalance.



Perfect!

WARRANTY

Each Locomotive Audio unit will be given a 60-day warranty from date of purchase covering parts and labor, excluding tubes purchased with unit. A 2-year warranty from date of purchase will be offered to original owners who register their product within the first 30 days of ownership.

Warranty is void if the product serial number has been removed or if the product has been damaged due to misuse, accident, unauthorized modification or repair. Locomotive Audio, LLC. reserves the right to determine when a problem or issue is eligible for warranty. Warranty is non-transferable and applies only to the original purchaser.

In no event will Locomotive Audio, LLC. be liable for any incidental or consequential damages resulting from any defect in the product, including lost profits, damage to property and, to the extent permitted by law, damage for personal injury, even if Locomotive Audio, LLC. has been advised of the possibilities of such damages.

REGISTRATION

Email support@locomotiveaudio.com the following info within 30 days of purchase to receive the full 2-year warranty from date of purchase.

- **Purchaser Name, phone number, email and mailing address**
- **Legible scan or photograph of the original sales receipt**
- **Serial # from stamped metal plate on back of unit**

SUPPORT & SERVICE

In the unlikely situation that something would go wrong with your unit, we would be happy to fix it up for you! Please visit our support page to gain further instructions on how to contact us.

If it is determined your product requires repair, we'll let you know where to ship it and we'll also issue a Return Merchandise Authorization number (RMA). This number must be displayed on the outside of your shipping box. Most repairs take approximately 1 week. We will match the shipping method you used to get it to us. (If you shipped it to us UPS ground, we will ship it back to you UPS ground; if you overnight it to us, we will ship it back to you overnight). You pay the shipping costs to us; we ship it back to you free of charge.

CONTACT INFORMATION

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St. Louis, MO 63109

support@locomotiveaudio.com

314.282.0133



DECLARATION OF CONFORMITY

MANUFACTURED BY:

Locomotive Audio, LLC.

ADDRESS:

P.O. Box 21751
Saint Louis, Missouri 63109

PRODUCT:

14B Single Channel Tube Compressor

CONFORMITY:

Low Voltage Directive 2006/95/EC

(EN 60065:2002/A1:2006 + A11:2008 + A2:2010 + A12:2011)

EMC DIRECTIVE 2004/108/EC

(EN 55103-1:2009 & EN 55103-2:2009)

Year of Affixing CE marking: 2014

The undersigned does hereby declare that the equipment
complies with the above directives.

Eric Strouth
President

Locomotive Audio, LLC.
November 1, 2014



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